

IOWA DEPARTMENT OF NATURAL RESOURCES
Underground Storage Tank Section

GUIDANCE DOCUMENT

Underground Storage Tank Closure Procedures for Filling in Place

Iowa Department of Natural Resources
Underground Storage Tank Section
502 East 9th Street
Des Moines, IA 50319-0034
515/281-4367

www.iowadnr.wmad.org

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List of Laboratories attached

STEPS TO SUCCESSFUL UST CLOSURE

Underground Storage Tank Fill in Place Checklist

STEP 1 - Notification of Intended UST Closure Activity

- [] Send DNR Form 542-1308 "Notification of Closure/Change-in-Service" to this department.
 - DNR Form 542-1308 must be filled out COMPLETELY, ACCURATELY and SIGNED by the owner or Responsible Party.
 - DNR Form 542-1308 must be received by this department AT LEAST 30 DAYS BEFORE closure of the tanks is scheduled to take place.

STEP 2 - Preparatory Activities

- [] Confirm the availability of those contractors you may be using on the anticipated closure date. Notify DNR of any changes to the date of closure for your UST system.
- [] Notify your laboratory of the types of samples you will be needing and request the necessary sample containers. Testing for petroleum products shall be conducted by methods OA-1 and /or OA-2. Copies of these methods are available from the DNR.
- [] Obtain the necessary sampling equipment and packing materials to store the samples at approximately 40 degrees Fahrenheit after collection and during shipment. Samples must be sent to an Iowa certified laboratory within 72 hours of collection.

STEP 3 - Oral Confirmation of Closure Date

- [] Contact (telephone) the DNR field office 24 hours prior to actual closure to confirm the removal date (page 2).

STEP 4 - UST Closure Activities

Sampling Procedures and Tank Removal are explained in greater detail on the following pages.

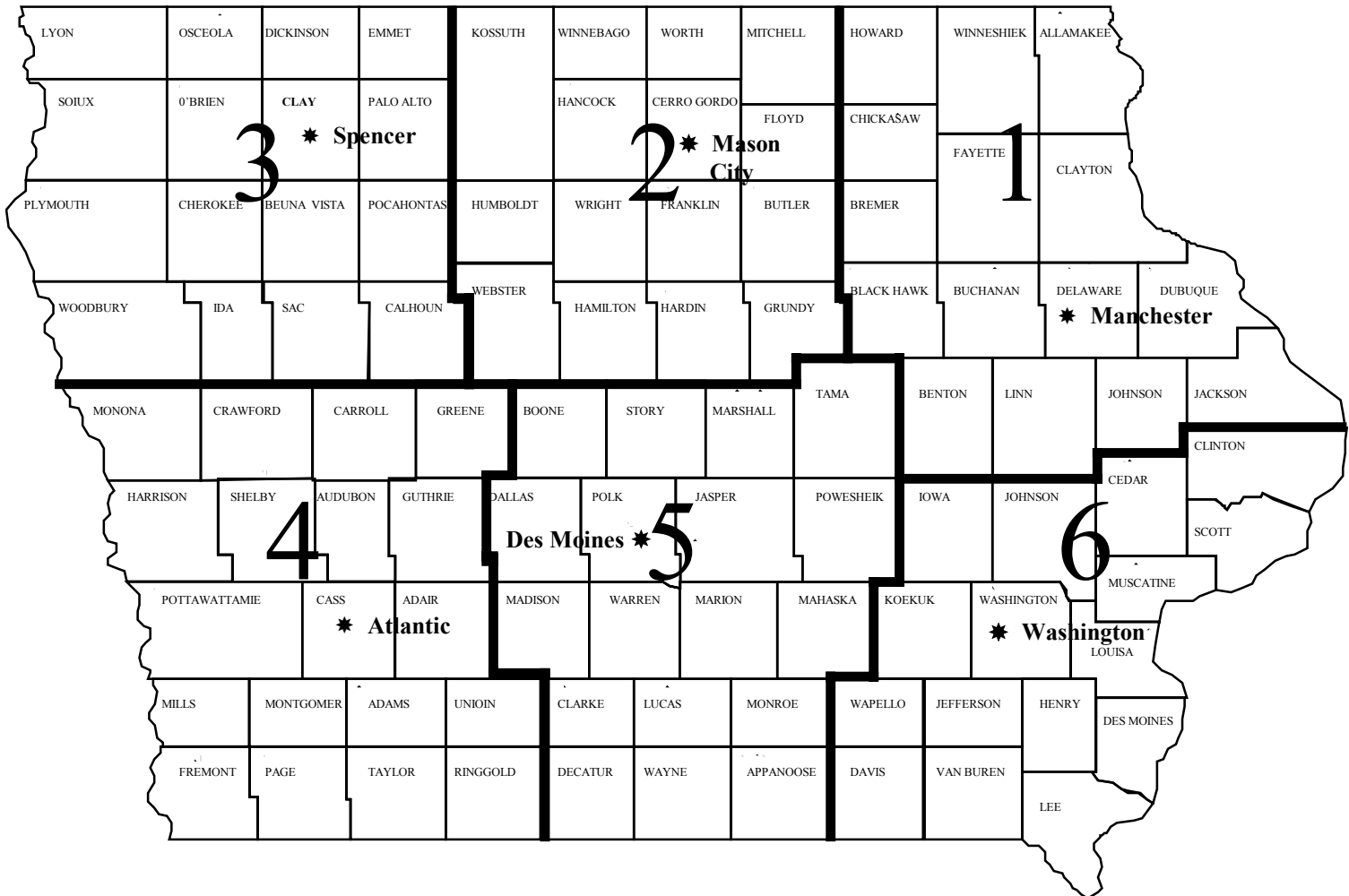
- [] Remove all contents from the UST and dispose of According to DNR's solid waste rules.
- [] Disconnect all piping except for fill pipes and vent pipes. If the piping cannot be removed, it must be capped and sealed. Removal is preferred to capping and sealing.
- [] Conduct the soil and water sampling according to the procedures in Section II of this document. **If contamination is found during soil or groundwater sampling, you must contact the DNR (Section I, Item 2, Reporting Contamination) and report the contamination. Closure operations will cease and you will be given new guidance for the closure of your UST site.**

STEP 4 - Closure Report

Approved external leak detection equipment in use for 90 days prior to closing date may satisfying this requirement

- [] **Within 45 days of soil and groundwater sampling**, submit a copy of the laboratory reports with a dimensional drawing (Addendum B) of the site indicating tank and sample locations, to the DNR.
- [] **WRITTEN APPROVAL FROM DNR**, usually within 14 days, must be received by the owner before filling the tank according to approved procedures (Section IV). Only approved filling materials and methods may be used. Water IS NOT an approved material.
- [] **The tank must be filled within 30 days after departmental approval** for filling the tank. Written notification and the tank tags must be submitted to the department within 15 days after filling the tank.
- [] Written confirmation of receipt of the closure report, laboratory results and dimensional drawing will be mailed to the owner after all these items have been received and reviewed by the department.

Environmental Protection Division
Field Offices



Field Office 1: **Manchester, IA 52057**
909 W Main, Suite 4
319.927.2640
FAX: 319.927.2075

Field Office 2: **Mason City, IA 50401**
2300 15th St., SW
641.424.4073
FAX: 641.424.9342

Field Office 3: **Spencer, IA 51301**
1900 N Grand Avenue
712.262.4177
712.262.2901

Field Office 4: **Atlantic, IA** 50022
1401 Sunnyside Lane
712.243.1934
FAX: 712.243.6251

Field Office 5: **Des Moines, IA** 50309
401 SW 7th Street, Suite I
515.725.0268
515.725.0218

Field Office 6: **Washington, IA** 52353
1004 W Madison
563.653.2135
FAX: 563.653.2856

IOWA DEPARTMENT OF NATURAL RESOURCES

UNDERGROUND STORAGE TANKS (UST)

CLOSURE IN PLACE - Guidance Document

This document provides underground storage tank (UST) owners with an approved procedure for closure in place of an UST. It is intended to help owners and operators of USTs comply with federal and state rules concerning permanent closure of their UST system. This document is not intended to be an in-depth explanation of the rules governing UST systems. Underground storage tanks that were last used before January 1, 1974, are not required to comply with these closure procedures unless there is evidence of a release of product from the tank(s) or there has been product in the tank after January 1, 1974. To claim this exemption, an UST owner must submit the affidavit "January 1, 1974 Exclusion" to the department (attached). However, for the benefit of the owner, it is recommended that these procedures be followed for all "In Place" UST closures.

REFERENCES

The following publications are referenced in Chapter 567-135 IAC "Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks" and should be used as a guide to further assist in the closure process:

- A) American Petroleum Institute Recommended Practice 1604, "Removal and Disposal of Used Underground Petroleum Storage Tanks;"
- B) American Petroleum Institute Publication 2015, "Cleaning Petroleum Storage Tanks;"
- C) American Petroleum Institute Recommended Practice 1631, "Interior Lining of Underground Storage Tanks;" ⁽¹⁾
- D) The National Institute for Occupational Safety and Health "Criteria for a Recommended Standard: Working in a Confined Space" may be used as guidance for conducting safe closure procedures at some hazardous substance tanks. ⁽²⁾
- E) NFPA 326, "Standard for the Safeguarding of Tanks and Containers for Entry, Cleaning or Repair," 1999 Edition

Direct correspondence to:	IOWA DEPARTMENT OF NATURAL RESOURCES UNDERGROUND STORAGE TANK SECTION 502 East 9th Street DES MOINES, IA 50319-0034
or call	515.281.4367

SECTION I - REPORTING REQUIREMENTS

1) Underground Storage Tank Closure or Change-in-Service:

Underground Storage Tank Closure Notification Form number 542-1308 must be filed with the Department of Natural Resources at least 30 days prior to beginning closure activities. Acknowledgment and a determination of the appropriate closure date will be mailed to the filer of form 542-1308 within 15 days of receipt by the department.

2) Reporting Contamination:

WHEN EVIDENCE EXISTS INDICATING THERE HAS BEEN A RELEASE TO THE ENVIRONMENT AT THE SITE OF CLOSURE OF THE TANK OR PIPING, the contamination must be reported to the Department within 24 hours of discovery. This report should be reported by telephone to 515/281-4367 or by fax to 515/281-8895.

WHEN AN IMMEDIATE THREAT EXISTS IN CONJUNCTION WITH THE CONTAMINATION, SUCH AS:

- A) explosive conditions are present due to the contamination,
- B) public or private drinking water supplies are threatened, or
- C) an immediate danger to life or health exists due to contamination.

This contamination must be reported to the Department of Natural Resources within 6 hours of discovery. Reports can be made by phone to 515/281-8694. This phone number is only to be used for reporting when an immediate threat such as described above is present.

Upon receiving the report, the Department will provide further direction.

3) Closure Confirmation Report

A closure confirmation report must be submitted to the department within 45 days after soil and groundwater sample results have been received. The department will respond to the closure report in a letter, usually within 14 days. The tank must be filled within 30 days after department approval letter. The owner or operator must notify the department within 15 days after filling the tank with inert, solid material. A copy of the invoice indicating the amount and type of inert, solid material should be included in the notification.

Refer to page 8, Section III, for a complete list of what to include in the closure report and notification.

4) Disposition of Contaminated Soil and Debris:

Refer to Page 9, Section IV.

5) Storage and On-Site Maintenance of Records:

Records (including maps, correspondence, boring/well logs, monitoring results), copies of laboratory results and any other pertinent information received or generated as a result of closure activities must be maintained on site by the owner/ operator, for at least three years after the closure has been completed and must be readily available to an inspector from the Department of Natural Resources.

PLEASE NOTE The Underground Storage Tank site records maintained by the Department of Natural Resources will not reflect changes due to closure activities until all reporting requirements have been met by the UST owner or operator.

SECTION II - SAMPLING PROCEDURES AND ANALYSIS

If approved external leak detection equipment has been in place for the affected UST system for a minimum of 90 days prior to the date of receipt of the closure notice by the department, the equipment is operational, and the required monitoring and records have been maintained, then the soil and groundwater sample requirements may be satisfied by submitting to the department:

- 1) form 542-1308 (Notice of Closure or Change-in-service); 2) complete record of the monitoring results, 3) the specifications of the monitoring equipment, 4) monitoring method used, and 5) verification that no release to the environment has occurred by providing a notarized statement from the owner to that effect (refer to page 15).

1) Soil Sampling:

Equipment needed:

- Augering equipment or tool capable of boring to a depth of at least two feet below the bottom of the tank, and
 - Sample containers with Teflon septa-lined lids obtained from the lab to which the samples will be submitted for analysis. OR
 - Soil sampler kit containing a soil sampling tube with a removable rigid acetate liner. The sample tube must be at least 18" long and capable of removing a soil core of at least 0.9 inch diameter.
- [CONTACT YOUR LABORATORY FOR INFORMATION ON SAMPLING EQUIPMENT AND CONTAINERS]
- Equipment to maintain samples at approximately 40 degrees Fahrenheit until delivery to the laboratory within 72 hours.

Procedure:

- 1) Soil samples around the tanks should be taken within five feet of the sides and ends and at a depth of two to four feet below the base of the tank, and beneath the backfill material in native soils. The samples must be taken at equal intervals around the tank. (See Addendum A)
- 2) Soil samples along product piping must be taken every ten linear feet and at a depth of one to two feet beneath the piping fill material in native soils.
- 3) Sketch a dimensional drawing of the UST site. See Section I and Addendum B.
- 4) A continuous-flight, hollow stem auger is recommended for securing the soil sample. If sand, rock or highly permeable soil is encountered while boring, boring shall continue until low permeable soil or groundwater is reached.

Soil Sample Collection Options:

Samples in glass container:

For samples collected in glass containers, the appropriate containers must be obtained from the laboratory doing the analysis. The soil always must be compacted into the container tightly, with no void spaces visible in the container, and the lid secured tightly. A minimum of one sample container per sampling point is required. Additional containers may be required by the laboratory. Since sample collection may be difficult from deep excavations, soil cuttings from the tip of the auger used to bore the hole may be placed in the lab containers when such difficulty is encountered.

Soil samples with acetate liner:

For a continuous-flight, hollow stem auger, a soil sampler internally lined with the rigid acetate liner may be inserted into the hollow stem with a sampler rod. Drive the sampler rod down into the borehole to obtain a core of the soil at the bottom of the borehole. Carefully remove the soil sampler and check to see if a sample has been retained. If the liner does not contain at least two-thirds of the original liner length, sample collection must proceed according to Item 5b of this procedure.

- 5) Remove the acetate liner with the soil sample and cut off any excess liner not containing soil. Immediately cap each end of the liner with the caps provided and seal with friction tape.
- 6) Label each sample as it is identified on the dimensional drawing indicating the facility name, tank owner, date and the substance stored in the underground tank. The samples must be maintained at approximately 40 degrees Fahrenheit. Do not allow the sample to freeze.

- 7) Prepare the samples for delivery to the laboratory by placing the samples into an iced cooler or equivalent for shipment. Temperature should be maintained at approximately 40 degrees Fahrenheit during shipping. If the acetate liner/sample does not fit entirely into the cooler, the liner/sample may be cut, provided it is clearly labeled, identifying the sample orientation (i.e., top and bottom of original sample) in order that the laboratory may analyze the appropriate portion of the sample. Samples must be shipped to an Iowa certified laboratory within 72 hours of collection.

2) Groundwater Sampling

Equipment Needed:

- Augering tool or drilling rig capable of boring to the groundwater. The action of boring must be performed by a certified well contractor in accordance with Chapter 567--82(455B) of the Iowa Administrative Code, except that a person may construct or reconstruct a well, install pitless equipment or plug a well on their own property without being certified. Local health codes may also require a well construction permit.
- A clean, transparent, commercially manufactured bailer suitable for the substances that have been stored in the tanks.
- Several sampling containers with screw top Teflon-lined lids obtained from the analytical laboratory to be used.
- Equipment to maintain samples at approximately 40 degrees Fahrenheit during delivery to laboratory.
- Scrub brush, detergent and a supply of distilled water.

Procedure:

- 1) If soil borings have been completed and contamination is evident, see Section I part 2 - "Reporting Contamination."

IF BEDROCK IS ENCOUNTERED BEFORE GROUNDWATER, SEE ADDENDUM E, PAGE 13
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- 2) Sampling of groundwater shall be performed outside of the tank excavation or the tank cluster via at least one monitoring well or borehole positioned downgradient within 20 feet of the excavation. (See Addendum A). If a tank cluster is involved, the borehole should be placed at the midpoint of the side downgradient of the cluster. Draw a dimensional overview of the tank excavation area indicating the position of the boreholes (See Addendum B). Tank cluster refers to an installation containing more than one tank where the separation distances between the tanks are less than or equal to ten feet.
- 3) If, after boring more than 12 feet below the bottom of the tank, groundwater is not encountered and sands or highly permeable soils are not present, a groundwater sample may not be required. See Addendum C for complete information.
- 4) Develop the monitoring well by allowing the bailer to fall freely through the borehole until it strikes the surface of the water. Immediately after the bailer fills, rapidly withdraw the full bailer. Check the sample for free product. If present, see item number (4). If no free product or sheen is observed, repeat until the water sample is free from suspended particulate matter and fine sands. Allow the monitoring well to recharge with groundwater.
- 5) Collect a water sample by lowering the bailer into the borehole until it is just under the water's surface. Remove the bailer and check for free product/sheen floating on the sample's surface. If free product is observed, contact the department at 515.281.4367. If no sheen or free product is observed, pour a portion of the water collected in the bailer into the sampling containers provided by the laboratory.
- 6) Label the water sample according to the dimensional drawing and include on the label the date, facility name, tank owner's name and substance stored in the tank. Fill each container so there is no air space **but do not overfill**. Secure the lid on each container after filling. Repeat the sampling procedure for each borehole if more than one borehole is drilled downgradient of the tanks.
- 7) Prepare the samples for shipment by placing them into an iced cooler or equivalent maintained at approximately 40 degrees Fahrenheit. Samples must be shipped to an Iowa certified laboratory within 72 hours of collection.
- 8) After the well or borehole is no longer needed, fill from bottom to top with neat cement or bentonite products, unless the hole seals itself by withdrawal of the casing.

3) Laboratory Procedures for Testing Soil and Groundwater Samples:

Soil Samples

Soil samples must be analyzed separately for high volatile petroleum compounds (gasoline) with each concentration reported separately (benzene, ethylbenzene, toluene, xylene) using analytical method OA-1. If any grade of diesel fuel, fuel oil, kerosene, oil, or mineral spirits had ever been stored in the tank, soil samples must be analyzed for Total Extractable Hydrocarbons using Method OA-2. If there is a history of use other than gasoline or if it is unknown whether any product other than gasoline had been stored in the tank, soil samples must be analyzed for Total Extractable Hydrocarbons using Method OA-2.

Water Samples

Water samples must be analyzed for benzene, toluene, ethylbenzene and xylene using analytical Method OA-1. If any grade of diesel fuel, fuel oil, kerosene, oil or mineral spirits had ever been stored in the tank, water samples must also be analyzed for Total Extractable Hydrocarbons using Method OA-2. If there is a history of use other than gasoline or if it is unknown whether any product other than gasoline had been stored in the tank, groundwater samples must be analyzed for Total Extractable Hydrocarbons using Method OA-2.

Non-petroleum Regulated Substances

For tanks containing non-petroleum regulated substances, the substance and its breakdown constituents must be analyzed, using the appropriate EPA and DNR approved analytical methods.

Contamination Corrective Action Levels

	<u>Soil (mg/kg)</u>	<u>Groundwater (ug/L)</u>
Benzene	0.54	5
Toluene	42	1,000
Ethylbenzene	15	700
Xylene	No Limit	10,000
Total Extractable Hydrocarbons (TEH)	3,800	1,200
TEH (Waste Oil)		400

SECTION III - TANK FILLING PROCEDURE & CLOSURE COMPLETION

Equipment Needed:

- Concrete, flowable mortar or other fill material approved by this department to completely fill the underground tank to 100% of capacity.
- Sand which is generally available and will flow readily, can be a suitable material if it is free of rocks which would prevent leveling out in the tank. The sand should be introduced dry. As it nears the top of the tank, the sand can be washed into the tank with NOMINAL amounts of water and puddled causing it to flow to the ends. USE OF LARGE AMOUNTS OF WATER IS PROHIBITED AS IT WILL CAUSE THE TANK TO BE FILLED WITH WATER BEFORE IT IS FILLED WITH SAND. **THIS PROCEDURE REQUIRES PRIOR APPROVAL BY THIS DEPARTMENT.**
- To obtain approval of sand or other materials for use as fill material, a detailed plan of application and product information which includes the material's properties with regard to ballast ability, ability to fill the tank to 100% capacity, durability of the product after application, special requirements or safeguards in filling the UST with the product, the product's relative inertness, and any other pertinent information must be submitted to the department for review and approval.

Procedure:

- 1) **The tank owner must have approval from DNR, PRIOR to filling any tanks.**
- 2) Purge the tank and surrounding area of all vapors, **and monitor with a combustible gas indicator continuously during the procedure. Work should cease if the reading exceeds 10% of the lower flammable limit. When the tank must be entered, an oxygen concentration-indicating meter is highly recommended with a minimum concentration of 19.5% free oxygen.**
- 3) Examine the tank for two openings, one at each end of the tank. One opening must be large enough to accept the fill material. The other opening is an observation hole to ensure the tank is filled to capacity. If sufficient openings do not exist, excavate to the top of the tank and make the openings. Cap or plug all other openings.
- 4) Clean the tank according to the procedures stipulated in the American Petroleum Institute Publication #2015, "Cleaning Petroleum Storage Tanks" See page one - references.
- 5) Fill the tanks using concrete or flowable mortar or other approved material until the inert material flows out of the observation hole.
- 6) Notify this department, in writing, that the closure has been completed. Confirm the method used to close the UST site, the date of closure, and the amount and type of solid, inert fill material used to close the tanks (e.g., the invoice for the material). Indicate the disposition of any material that was present inside the UST and any monitoring wells that were constructed.

Closure Report Form (prior to filling in place)

Within 45 days of sampling, a closure report form must be submitted to the department. The form is included with this guidance material. You may obtain extra copies of the closure form through our web site (www.iowadnr.wmad.org), or by calling the department or Field Office in your region. The report must include:

1. Brief narrative including
 - a. site description/location, date of sampling activity, number, size and contents of tanks to be filled in place
 - b. identification of owner and contractors
 - c. disposition of product/material present in the UST and tank purging/cleaning procedures
 - d. brief description of sampling locations
 - e. summary of analytical results
 - f. waste product treatment/removal
2. Certified laboratory analytical results for each sample, including completed chain of custody form(s)
3. Stratigraphic logs of the boreholes and construction details of the monitoring well, and disposition of the monitoring well(s) after sampling
4. Dimensioned diagram of site which includes:
 - a. tank/piping location/depth and sampling locations/identification
 - b. buildings on site
 - c. groundwater flow direction
 - d. reference direction
5. Tank tags
6. Other documentation:
 - a. tank cleaning (signed statement, photographs)
 - b. solid, inert material used to fill tank in place (e.g., invoice)

SECTION IV - WASTE PRODUCT TREATMENT & DISPOSAL

SOLIDS:

Solids which exceed the minimum standards of the Department of Natural Resources for contamination can be treated and disposed of by utilizing either one or a combination of the following methods:

- (1) **Land application** of the solid material. Prior to land-applying contaminated solids, "Notification Form for Land Farming Petroleum Contaminated Soil" with a contour map of the application area must be submitted to the Department (567--121.3(2) IAC).

Restrictions-

- 1) Maximum application rate - four inches thick or 500 tons/acre/year.
- 2) Slurries or semi-solids cannot be land-applied without a permit.
- 3) Separation Distances; wells - 500 feet; residences - 200 feet; streams, lakes, ponds, sinkholes, tile intakes - 200 feet.
- 4) Application on frozen or snow-covered ground is restricted to application rates under 1/4 inch thick on a land area of less than 5% slope.
- 5) For any application, slope cannot be greater than 5% and mechanical incorporation within 48 hours is required when application exceeds 1/4 inch.
- 6) Land application may only occur on soils deemed acceptable using USDA soil classifications and must be a minimum of six feet above bedrock.
- 7) Site specific conditions may necessitate environmental sampling.
- 8) Records must be maintained on premises in compliance with (567--121.3(2) IAC) for a period of at least five years.

PLEASE NOTE: For Complete Details, Request Guidance and Notification Form For Land Farming From This Department.

- (2) **Landfill Disposal** of the solid material is a second alternative. Solid wastes may be disposed of in a local sanitary landfill provided the landfill management agrees to accept the waste, and the disposal does not violate the conditions of the landfill permit as regulated by chapters 567--100 through 110 of IAC. The landfill should be contacted prior to delivery of the waste products to the landfill. Liquids and semi-solids cannot be disposed of in a sanitary landfill. Additional information may be obtained by calling the Solid Waste Section of the Department of Natural Resources.

- (3) **Alternative Methods** for treating and disposal of solid waste materials must comply with state requirements (Chapters 567-100 through 110 IAC) and it must be approved by this department prior to utilization.

LIQUID AND FLOWABLE WASTE PRODUCTS:

Remove liquids and flowable wastes from the UST system, utilizing explosion-proof or air-driven pumps. Pumps, motors, and hoses must be grounded to prevent any explosion hazards due to sparks. Contents must be removed so that no more than one inch of material remains within the UST. The area must be vapor-free for the use of suction apparatus.

Once contents are removed, all free product must be separated from the balance of the waste and recycled or re-processed in a manner allowable by law. The remaining product can be disposed of as follows:

- 1) Ship to an individual or firm authorized to receive and neutralize or destroy the waste product, or
- 2) Solidified in a manner approved by the department and dispose of as described above for solid wastes.

A liquid waste product cannot be discharged upon or into the ground or a water of the State without prior approval by the Iowa Department of Natural Resources (567--64.3(1) IAC). If the recipient of the waste operates under an NPDES permit issued by this department, a copy of the NPDES holder's agreement to accept the waste material from the UST owner must be delivered to this department prior to disposal of the waste material.

PLEASE NOTE: The contents of the tank may be subject to regulation as a hazardous waste as defined by CFR Section 302(4). For information on these regulations contact the RCRA HOTLINE at (800) 424-9346.

ADDENDUM A

Soil and Groundwater Sampling Locations and Distances (Closure in Place)

Tank Capacity (gallons)	# of Samples	Location	Example ("X" location of sample)
----------------------------	--------------	----------	----------------------------------

6,000 or less

4

one from each end and each side

X

X



X

X

6,001 to 12,000

6

one from each end and two from each side

X

X

X



X

X

X

12,001 or greater

8

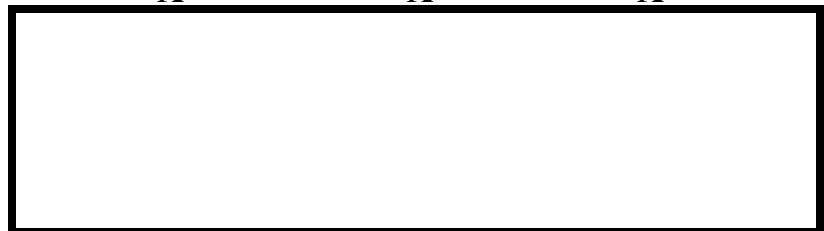
one from each end and three from each side

X

X

X

X



X

X

X

X

NOTE:

1) Sample between one and two feet into native soils below the tank and its backfill area.

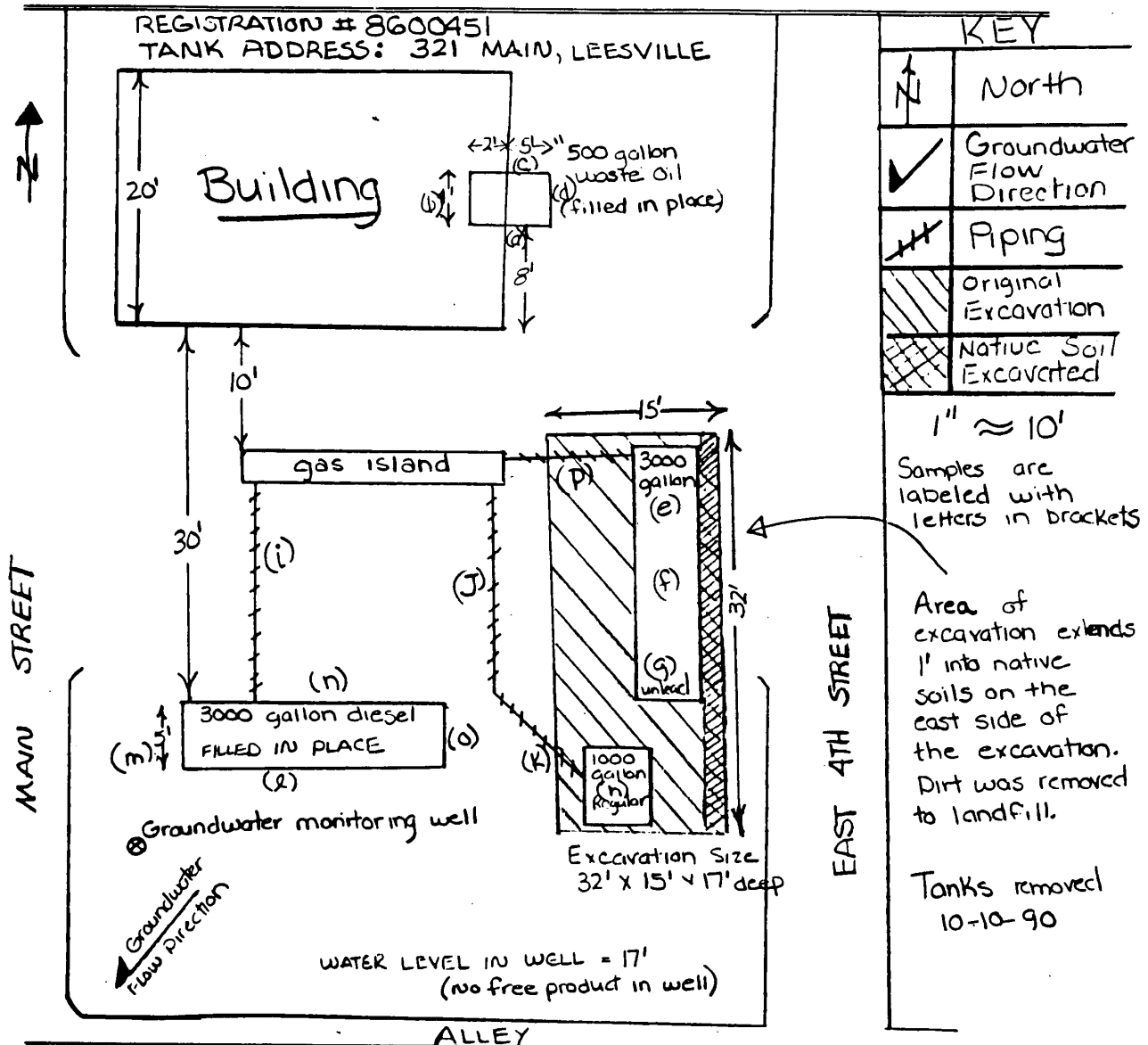
2) Sample once every ten feet of piping between one and two feet into native soils in the floor of the piping excavation or if the piping is not removed, into native soils below piping backfill area.

*** GROUNDWATER SAMPLE ***

Locate the well or borehole downgradient front the UST, as close to the UST as practical but no farther than 20 feet from the UST. The sample must be taken from the first saturated groundwater zone encountered.

ADDENDUM B

Example of a Dimensional Drawing (site diagram)



The Dimensional Drawing (site diagram) must indicate the following:

- 1) Area which was excavated during the tank closure and extent of native soils removed.
- 2) The length of the interconnecting piping and whether removed.
- 3) Sampling locations that should correspond to laboratory analysis
- 4) Identify the tanks and whether removed, closed in place, or still active.
- 5) Buildings, groundwater flow and directions indicated for reference.

THIS DRAWING DOES NOT NEED TO BE PROFESSIONALLY DRAWN, BUT IT DOES NEED TO BE LEGIBLE AND COMPLETE !

ADDENDUM C

QUALIFICATIONS FOR EXCLUDING GROUNDWATER SAMPLES FOR UST CLOSURES

If groundwater is encountered within ten feet below the lowest level of the tank, a groundwater sample is required. If groundwater is not encountered within ten feet below the lowest level of the tank, but sands or highly permeable soils are encountered, or there are other indications of potential for groundwater contamination, a groundwater sample or samples are required. See Section II, Part 2 on page 6 of this guidance document.

CONDITIONS FOR EXCLUSION

If sands or highly permeable soils are not present in a boring located within 20 feet downgradient from the tank excavation and groundwater is not encountered within ten feet below the lowest level of the tank excavation, the certified well contractor's log and the results of a hydraulic conductivity test must be submitted with the closure report to the DNR. The hydraulic conductivity test must be conducted by a person knowledgeable in the performance and interpretation of such testing. The results of the test must indicate a conductivity rate less than 0.3 meter per day in order to exclude the groundwater sample requirement.

A hydraulic conductivity test, using a Guelph permeameter or an equivalent in situ constant head permeameter in a boring which terminates above the water table and ten feet below the lowest level of the tank excavation is acceptable. If laboratory methods are used, collect undisturbed soil samples using a thin-walled tube sampler in accordance with the American Society of Testing and Materials (ASTM) Standard D1587. Samples shall be clearly marked, preserved and transported to the laboratory. The laboratory shall measure hydraulic conductivity using a constant-head permeameter in accordance with ASTM Standard D2434 or a falling-head permeameter in accordance with acceptable methodology.

DEFINITION OF HIGHLY PERMEABLE SOILS

Sands and highly permeable soils for the purposes of UST closures are defined as:

- I. Soil materials classified by the Iowa Geological Survey Bureau as follows:
 - a) **(CGg)** clean well sorted gravel greater than 0.25 inches in diameter
 - b) **(CGs)** gravel with minor amounts of sand
 - c) **(CGc)** clean sand
 - d) **(CGp)** sand with minor amounts of pebbles or gravel
- II. Fractured bedrock
- III. Any soils having a hydraulic conductivity rate greater than 0.3 meter per day

ADDENDUM E

ENCOUNTERING BEDROCK DURING GROUNDWATER SAMPLING FOR TANK CLOSURE

CERTIFIED WELL DRILLER AND GROUNDWATER PROFESSIONAL REQUIRED

For all tank closures, a groundwater sample is required from the first saturated groundwater zone. The monitoring well or boring must be positioned downgradient, outside of the tank pit, and not farther than 20 feet from the tank pit. If the top of the water table is suspected to be within bedrock or if bedrock is encountered before groundwater during drilling activity, a certified well contractor must conduct the drilling and a certified groundwater professional must conduct the assessment and sampling activity.

BEDROCK ASSESSMENT

If bedrock is encountered before groundwater, special assessment procedures must be followed. Caution must be taken to avoid creating a conduit for contaminants to reach a bedrock aquifer by drilling through contaminated soils above bedrock.

FIELD SCREENING FOR CONTAMINATION

The groundwater professional must first identify the presence of petroleum contamination in the soil (overburden) through the use of field screening methods (e.g., PID, FID, GC) in order to reduce the risk of spreading contamination to the bedrock aquifer and to determine an appropriate drilling method and monitoring well construction technique. If field screening indicates contamination in the overburden, the most contaminated soil should be determined and selected for lab analysis. Owners and operators must report to the department the discovery of a release in accordance with 135.6.

TIER 2 ASSESSMENT

If contamination in the overburden exceeds Tier 1 levels, a Tier 2 assessment will be required. Owners and operators have the option of conducting a Tier 2 assessment rather than proceeding with the installation of a monitoring well for tank closure.

WHEN BEDROCK CONTAMINATION IS SUSPECTED

If the use of field screening indicates the presence of contamination in the overburden, the overburden must be isolated from the bedrock by installing a permanent casing before continuing drilling, sealing all the casing string with grout seal and seating the casing in the bedrock. Installation of a grout seal around all of the casing in the overburden and seating the casing in the bedrock should ensure the well will remain free of petroleum contamination. The casing should be set and all equipment removed and cleaned before continuing to drill to water.

The bedrock cuttings should be continuously screened for the presence of contamination. The bedrock boring may be cased or uncased depending on the friability of the bedrock material. After the first saturated groundwater zone is encountered, either a temporary well or permanent well may be installed and a water sample collected for lab analysis.

CONTAMINATION IN THE OVERBURDEN WITH A CONFINING UNIT

If while drilling into bedrock a substantial confining layer of material (e.g., shale) is encountered before groundwater, drilling should cease. The confining layer should trap groundwater as well as contamination from a release in the UST system. Construct a temporary well above the confining unit to collect a groundwater sample for lab analysis.

NO CONTAMINATION IN THE OVERBURDEN

When the presence of contamination in the overburden is not identified through field screening or analysis, an uncased groundwater monitoring well may be constructed, and a water sample from the bedrock aquifer may be collected for lab analysis.

USTs SET IN BEDROCK

If the UST is resting on bedrock, examine the tank pit for petroleum staining. If petroleum staining is present, remove all backfill material. If the base of the tank pit is bedrock, but the sidewalls are not bedrock and staining is present in the UST pit, collect a soil sample from each of the sidewalls (nearest the bedrock surface). Use field screening methods to locate the presence of contamination in the tank pit.

SUMMARY

Before a groundwater monitoring well is constructed in bedrock, a certified groundwater professional must evaluate the subsurface conditions of the UST site. The purpose of the evaluation is to determine the potential for product migration and groundwater contamination. Some of the geologic information necessary for an assessment will be difficult to know in advance. Therefore, a full assessment of the bedrock conditions may not be known until after the drilling is completed. The evaluation should contain the following information:

1. Type of bedrock
2. The competence of bedrock (if available)
3. A description of the potential for karst development at the site (if available)
4. The presence or absence of water in the tank pit and the water source
5. The depth to groundwater (if available)
6. The direction of groundwater flow (based on topography and knowledge of local geology)
7. A description of the stratigraphy present in the area, i.e., surficial aquifers vs. deeper aquifers, etc.

CLOSURE REPORT

The above geologic information should be included in the closure report along with the items on pages 9-10.

PLUGGING ABANDONED WELLS

All abandoned wells and borings that access groundwater must be plugged according to 567-Chapter 39. DNR Form 542-1226 must be completed and submitted to the department.

AFFIDAVIT

January 1, 1974 Exclusion

STATE OF IOWA

ss:

COUNTY OF _____

I, _____, being duly sworn do depose and state the following to be true and correct to the best of my knowledge:

- 1) I am the owner of _____ underground storage tanks as defined by Iowa code section 455b.471(6) located at the address of _____ in the _____ quarter of section _____, township _____, range _____ East/West,
- 2) That these tanks were taken out of operation prior to January 1, 1974,
- 3) That these tanks have not contained a regulated substance since January 1, 1974,
- 4) That these tanks do not currently contain an accumulation of a regulated substance, and
- 5) The execution of this instrument is my voluntary act and deed.

Subscribed and sworn to before me, _____, a Notary Public in and for the State of Iowa, on this _____ day of _____ 19____.

(SEAL)

Notary Public

My commission expires _____

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THAT YOU MAY REMOVE THE AFFIDAVIT FOR
YOUR USE**

AFFIDAVIT
Monitoring Records Used In Lieu of Soil & Water Sampling

STATE OF IOWA

ss:

COUNTY OF _____

I, _____, being duly sworn state the following
to be true and correct to the best of my knowledge:

1) Approved leak detection as defined by Iowa code section 455b.135(5), is present on the
underground storage tanks located at (address) _____ in
the ____ quarter of section _____, township _____, range _____ East/West,

2) That the leak detection has been in proper operating condition since _____.

(DATE)

3) That the leak detection has been in operation since _____.

(DATE)

4) That there has been no indication of a release at this site, and

5) The execution of this instrument is my voluntary act and deed.

Subscribed and sworn to before me, _____, a Notary Public
in and for the State of Iowa, on this _____ day of _____ 19____

(SEAL)

Notary Public

My commission expires _____.

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THAT YOU MAY REMOVE THE AFFIDAVIT FOR
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